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UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service

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INFORMATION ABOUT BEE CULTURE

Apiculture Research Branch,
Entomology Research Division

If you have questions that are not covered in this publication, send your inquiries to the Apiculture Research Branch, Agricultural Research Center, Beltsville, Maryland. For local information write to the bee inspector of your State Department of Agriculture or the Extension Service at your State Agricultural College.

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The honey bee is our only source of honey and beeswax. It produces more than 260 million pounds of honey and about 5 million pounds of beeswax annually in the United States. However, these are merely by-products of the honey bee. Its principal role is in the pollination of over 50 different crops. If it were not for these pollinating insects we should soon be reduced to living on cereals and nuts. The honey bee is now the most important flower-visiting insect in practically all areas. Transfer of pollen from flower to flower is so essential to seed and fruit production that beekeeping must be carried on to maintain a profitable agriculture.

1/ This is a revision of ARS-33-10-2, Information about Bee Culture, issued in 1961.

2/ The inclusion of the names of companies does not imply endorsement of their products by the Department.

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CURRENT SERIAL RECORDS

Honey bees are kept by many persons as a hobby or as a side line. Apiculture, which is the keeping of bees and a study of their life and habits, holds a fascination for people in all walks of life, both young and old. A few colonies to furnish honey for the home table or to effect pollination can be kept almost anywhere. A beekeepers' organization has existed for years in the heart of New York City. If there is no close source of food, honey bees will fly several miles to find honey plants. There are about 300,000 persons who keep bees in this country, only a small percentage of whom are full-time commercial beekeepers. The latest figure of the Department of Agriculture places the total number of colonies in the United States at about 5½ million.

Advice to Beginners

First get a book and read the fascinating story of the honey bee. Some of these are listed on page 7. Free bulletins are available from your State Extension Service. Do not plan to start with more than 2 to 3 colonies. If possible visit a neighbor beekeeper. Talk it over with him. He may be willing to help you get started. Offer to help him so that you can get some experience. Your State College may offer a correspondence course in beekeeping. After gaining some experience a short course or a correspondence course would be worthwhile. With proper experience, a person in a favorable location can obtain from beekeeping a return that compares favorably with that from most agricultural pursuits.

Probably the best method of getting started is to purchase established colonies. This means bees, combs and hive complete. If you purchase established colonies, obtain them from a reliable beekeeper and be sure they are in modern hives and accompanied by a certificate of inspection to insure freedom from disease. Another method is to purchase a 3-pound package of bees with a queen and to install the bees in a hive equipped with frames containing full sheets of brood foundation. Either a 2- or 3-pound package of bees can be used when the beekeeper has an ample supply of brood combs containing sufficient pollen and honey to permit the colony to develop even though weather conditions prevent the bees from getting food. Instructions for installing usually accompany the package. A third way is to hive a swarm. With a swarm you need the same equipment as for a package. The best time to begin beekeeping with either swarms, package bees or established colonies is in the spring, when fruit trees and dandelions are in bloom.

The beginner's equipment may consist of the following items, although it is suggested that catalogs from some of the bee-supply houses be consulted for comparable information:

- I 10-frame hive, consisting of--
 - I bottom board
 - I 10-frame hive body complete with frames and brood foundation
 - 2 to 4 shallow supers complete with frames and thin foundation
 - I telescoping cover
- I 2- or 3-pound package of bees with queen
- I smoker
- I bee veil
- I hive tool
- 10 to 25 pounds of granulated sugar
- 4 ounces of No. 28 wire
- I spur embedder

Such equipment, plus a subscription to a bee journal, costs approximately \$25 to \$35. After you have become experienced and learn how to manage your colonies, the equipment can be modified and more can be added. The standard 10-frame hive is the type generally used in the United States.

Although factory-made equipment is ordinarily the most satisfactory, some persons prefer to construct their own hives. If you do this, it is a good plan to purchase or borrow a complete factory-made hive to use as a model. Be sure to reproduce all dimensions exactly; otherwise the bees will build combs and add propolis where it is not desired. Careful construction is necessary so that all hive parts are readily interchangeable. Hive plans may be available from your State College.

The honey produced in the shallow frames can be cut into four equal pieces and placed in individual leakproof plastic bags or may be cut in strips to fit glass jars with liquid honey poured around it. The liquid honey can be obtained by mashing the comb and straining out the wax particles. After a season or two you may wish to produce honey in the small wooden sections. To do this, however, requires more skill in handling the colony. To produce honey in the liquid form for bottling, you will need an extractor, a knife for uncapping the combs, a strainer, etc.

The Italian bee is the kind recommended for the beginner in this country. It is hardy, industrious, and fairly gentle, and it

is the bee most commonly kept in the United States. Specially bred hybrid bees are now available, too. Some are characterized by being very gentle.

Cardinal Points in Beekeeping

1. Bees need an abundant store of honey (25 or more pounds during the active season and 40 to 60 pounds going into winter), pollen, plenty of room for brood rearing, a source of water, protection from the wind, and exposure to sunlight.
2. There should be empty comb space in hives before and during a honey flow. When every cell becomes occupied with brood, pollen, or honey, the bees will swarm or stop working, in either event causing a loss of honey. It is especially important to give them plenty of comb storage space to discourage swarming.
3. For successful wintering a colony should have a young queen of high-producing stock, a large cluster of young fall-raised bees, at least 40 pounds of sealed honey, and several combs containing large areas of pollen. For these requirements a colony should have a 2-story standard hive or at least a brood chamber and one super.
4. Starvation is one of the principal causes of unprofitable beekeeping. If bees are short of honey, feed them a syrup of 2 parts of granulated sugar to 1 part of water. Lack of pollen can be compensated for by using a mixture of soybean flour and brewer's yeast. This mixture is available through bee supply dealers.
5. It is unprofitable, and in many states illegal, to keep bees in box hives or "gums."
6. Nectar resources may be improved by planting such crops as sweetclover. Trees and shrubs of value for nectar and pollen production should be planted for shade and as ornamentals. Much waste-land can be utilized for these purposes.

Insecticides and Bees

Field and orchard crops are important sources of pollen and nectar for bees, and, since such crops are often treated with insecticides, beekeepers frequently face a bee-poisoning problem. However, it is usually only when large areas are treated that bees are seriously affected. The occasional spraying of isolated plants or gardens may kill a few bees, but the overall effect on colonies is negligible. Complete loss of the field force or large numbers

of bees dead at the hive entrance may focus attention on the problem, but less noticeable, recurring losses may leave the colonies in a more precarious condition at the end of the season. Fortunately, there seems to be little danger of contaminated honey getting into their surplus stores.

How can the beekeeper minimize losses from insecticides? He can be forewarned of areas where their large-scale use makes beekeeping difficult. Such areas may have excellent potentials for honey production, but unfortunately the beekeeper is usually not in a position to "call the shots." The best hope lies in grower-beekeeper cooperation. An enlightened grower will exercise greater care in selecting insecticides and applying them under conditions that will safeguard the bees as much as possible.

If a beekeeper keeps posted as to the time and character of the insecticides to be applied in the vicinity of the colonies, he can judge the hazard and, if necessary, move his colonies to a temporary location out of flight range of the insecticides. If he has an opportunity to work with the farmers of his area to develop a program that safeguards bees, he should emphasize the following general rules: (1) insecticides should not be applied to open blossoms, (2) the safest time to apply insecticides is in the late afternoon after the bees have stopped flying; early morning applications are less dangerous than those in the middle of the day, but more so than those made in late afternoon, especially of such materials as Sevin, parathion and malathion which lose much of their toxicity overnight, and (3) for a given insecticide, sprays are less harmful than dusts.

Diseases of Bees

Honey bees, like most living creatures, are subject to certain diseases. The diseases are infectious, and care is required to lessen their spread and minimize their harm. Consequently, a beekeeper should familiarize himself with the characteristics of healthy, normal colonies in order to recognize the signs of disease.

The most common brood diseases are: American foulbrood and European foulbrood. Nosema disease is the most serious ailment of adult bees. Most bee diseases can be controlled by proper treatment.

Honey from unknown sources should never be fed to colonies since it may carry disease-causing organisms. These bee disease germs carried by honey are harmless to man. Unless the colonies can be provided with combs of honey from healthy hives, sugar sirup should be fed.

If disease is suspected, a sample may be sent to the laboratory for diagnosis, or assistance may be obtained from your State Apiary Inspector.

The U. S. Department of Agriculture examines samples of brood and adult bees. Such samples should be sent to the Bee Disease Laboratory, Agricultural Research Center, Beltsville, Maryland. Reports of these diagnoses are sent to the beekeepers and copies go to proper State apiary officials.

For a brood disease diagnosis cut a sample of comb about 4 inches square containing the affected brood or brood remains; no honey should be present and the comb should not be crushed. For diagnosis of adult diseases or insecticide poisoning, send about 200 sick or dead bees. Mail all samples in a wooden or strong cardboard box. Do not use tin, glass, plastic, aluminum foil, or waxed paper, as these materials promote growth of mold which increases the difficulty of making a satisfactory diagnosis. Write your name and address on the box. If the sample is forwarded by an inspector, his name and address should also appear on the box or in an accompanying letter.

Most State departments of agriculture maintain apiary inspection services which make diagnoses of bee diseases and give information on methods of controlling them. A certificate of inspection insuring freedom from disease should be required in purchasing bees and used beekeeping equipment.

Publications on Bee Culture

The world's literature on apiculture is very extensive. Thousands of books, both scientific and popular, have been published in all languages. Journals devoted to various phases of beekeeping are published regularly in all countries in which beekeeping is important. The following is a partial list of English language journals.

Bee World, 52 St. Bartholomew's Road, Nottingham, England
American Bee Journal, Hamilton, Illinois
Gleanings in Bee Culture, Medina, Ohio
Canadian Bee Journal, Port Hope, Ontario, Canada

Several State beekeepers' associations distribute periodical news notes to their members.

Books

The following books cover almost all phases of practical and theoretical bee culture as well as the romance of beekeeping. Some of these books may be in your public library and also available from book dealers:

Books for Beginners

ABC and XYZ of Bee Culture. The A. I. Root Company publishers.
Various editions.

Beekeeping as a Hobby. Kyle Onstott. 1941.

First Book of Bees. A. B. Tibbets. n.d.

First Lessons In Beekeeping. C. P. Dadant. Various editions.

500 Answers to Bee Questions. The A. I. Root Company. Various editions.

Hive and the Honey Bee. Roy A. Grout. 1947. (Rev. 1949)

How to Keep Bees and Sell Honey. Walter T. Kelley. Various editions.

Starting Right with Bees. A. I. Root Company. Various editions.

Other Valuable References

American Honey Plants. Frank C. Pellett. 1947.

Anatomy of the Honey Bee. R. E. Snodgrass. 1956.

Beekeeping In the Tropics. Francis G. Smith. 1960.

Bee Venom Therapy. Bodog F. Beck. 1935. (out of print).

Bees: Their Vision, Chemical Senses, and Language.
K. von Frisch. 1950.

Beeswax. H. H. Root. 1951.

Behavior and Social Life of the Honeybees. C. R. Ribbands.
1953.

Communication Among Social Insects. Martin Lindauer. 1961.

Dancing Bees. K. von Frisch. 1954.

Honey and Your Health. B. Beck and D. Smedley. 1944.

Honey in the Comb. Carl E. Killion. 1951.

Honey Plants Manual. H. B. Lovell. 1956.

Life of the Bee. M. Maeterlinck. Various editions.

Makers of Honey. Mary Phillips. 1956.

Practical Queen Rearing. Frank C. Pellett. Various editions.

Queen Rearing. H. Laidlaw and J. Eckert. 1950.

World of the Honey Bee. Colin G. Butler. 1954.

National Geographic. Vol. 116, No. 2, pp. 188-217. 1959.

Life. Vol. 15, No. 3, pp. 64-67, July 19, 1943, and Vol. 33,
No. 6, pp. 62-69, August 11, 1962.

Bee Culture Research Laboratories in the Department of Agriculture

In the Department of Agriculture the work on bee culture and insect pollination is conducted in the Apiculture Research Branch of the Entomology Research Division. Headquarters for the Apiculture Research Branch is at Plant Industry Station, Beltsville, Maryland. Most of the research is conducted at laboratories in different parts of the country in cooperation with the State agricultural experiment station or university. Their addresses are as follows:

Arizona--Bee Culture Laboratory, College of Agriculture,
University of Arizona, Tucson, Arizona.

Louisiana--Bee Culture Laboratory, Agricultural Center,
Louisiana State University, Baton Rouge, Louisiana.

Maryland--Bee Culture Laboratory, Agricultural Research
Center, Beltsville, Maryland.

Utah--Bee Culture Laboratory, Temporary Building F, Utah
State University, Logan, Utah.

Wisconsin--Bee Culture Laboratory, 1800 University Avenue,
Madison, Wisconsin.

Wyoming--Bee Culture Laboratory, University of Wyoming,
Laramie, Wyoming.

Information on Honey and Beeswax Issued in The Department of Agriculture

Other types of assistance rendered by various agencies in the Department are indicated below.

Semimonthly Market News Reports.--Selling prices and quotations on honey, with reference to different containers, grades, and floral sources, and sales records or offered prices on beeswax, as received from beekeepers, wholesale and retail sellers, in important producing areas, together with comments on the condition of bees and honey plants, and the honey market. Similar information and also honey arrivals and market conditions in 15 large marketing centers. Honey and beeswax import and export statistics shown by countries of origin or destination.

United States Standards for Grades of Comb Honey (effective August 1933) and of Extracted Honey (effective April 16, 1951).--Reprinted without change in April 1957 following a two-year review by members of the honey industry and the Department of Agriculture.

Both the market news reports and the grade standards are obtainable from the Fruit and Vegetable Division, Agricultural Marketing Service, Washington 25, D. C.

Production and Price Statistics.--Estimates issued three times a year by State from the Crop Reporting Board, Agricultural Marketing Service, Washington 25, D. C., as follows: In January, the yield per colony and total production of honey and beeswax for the preceding six years; stocks on hand for sale as of the preceding December 15, and prices of honey, by different types of sales, for the preceding two years. Late in July, the current season's colony count and condition of bees and nectar-producing plants as of July 1, and percentages of colonies lost during the previous winter and spring. In October, preliminary estimates of honey production for the current year, and stocks for sale as of September 15.

Price-Support Program.--The Agricultural Act of 1949, as amended, makes price support for honey mandatory at 60 to 90 percent of parity. The annual programs provide for the support of U. S. Grade C or better extracted honey of most flavors of that season's crop packed in containers of 5 to 70 gallon capacity. Support is carried out through farm-storage loans and by purchase agreements made by the Agricultural Commodity Stabilization and Conservation county offices in the counties where honey is stored. Loans and purchase agreements are available during the period April 1 through Dec. 31.

Research on Honey.--A program of basic and applied research is carried out on the composition and uses of honey, directed to increasing honey utilization in food and other industries. Information bulletins, reprints of technical and other articles are available from the Eastern Utilization Research and Development Division, Philadelphia 18, Pennsylvania.

Bee Supply Houses

The following companies handle supplies and equipment for beekeepers, including hives, honey-house equipment, containers, bees, and queens. Most of these companies will send catalogs on request.

Dadant and Sons, Hamilton, Illinois
Diamond Match Company, Chico, California
Hubbard Aplarles, Onsted, Michigan
Walter T. Kelley Company, Clarkson, Kentucky
Leahy Manufacturing Company, Higginsville, Missouri
August Lotz Company, Boyd, Wisconsin
Marshfield Manufacturing Company, Inc., Marshfield, Wisconsin
A. I. Root Company, Medina, Ohio
Superior Honey Company, Los Angeles, California; Ogden, Utah;
Phoenix, Arizona; and Denver, Colorado
Williams Brothers Manufacturing Company, Portland, Oregon
A. G. Woodman Company, Grand Rapids, Michigan
Montgomery Ward
Sears Roebuck

Organizations in the Beekeeping Industry

American Bee Breeders Association--Garnett Puett, Jr., Secretary,
Hahira, Georgia.

American Beekeeping Federation--Joseph Moffett, Secretary-Treasurer,
Fort Collins, Colorado. A national organization of State organ-
izations and individual beekeepers.

American Honey Institute--Mrs. Harriett M. Grace, Director, Commer-
cial State Bank Building, Madison 3, Wisconsin. An organiza-
tion supported by bee-supply companies, beekeepers' organiza-
tions, and individuals. Its purpose is to give publicity to
honey bee demonstrations, lectures, radio, and TV and to make
available honey recipes, and other literature.

Apiary Inspectors of America--John E. Long, Secretary, Westfield,
Wisconsin.

Bee Industries Association--John Root, Secretary, A. I. Root Company,
Medina, Ohio. Representing supply manufacturers.

Eastern Apicultural Society--Mary Louise Yates, Secretary-Treasurer,
Hartford, Connecticut. A society devoted to the cultural,
scientific, and practical aspects of bee culture. Membership
is open to all persons in the Eastern States interested in
honey bees.

Honey Bee Improvement Cooperative Association--Charles A. Reese,
Secretary, Ohio State University, Columbus, Ohio. A nonprofit
organization to promote the distribution of improved strains of
the honey bee.

Honey Industry Council of America--Leslie Little, Secretary,
Shelbyville, Tennessee. An organization of representatives of
the American Beekeeping Federation, Bee Industries Association,
American Bee Breeders' Association, and the National Honey
Packers and Dealers Association.

National Honey Packers and Dealers Association--Irvin A. Stoller,
Secretary, Latty, Ohio.

Southern States Beekeepers' Federation--Homer Tate, Secretary,
State College, Mississippi. An organization of honey producers,
shippers of package bees, and queen breeders devoted to the
interest of beekeeping in the Southern States.

American Committee, Bee Research Association--G. F. Townsend,
Chairman, Apiculture Department, Ontario Agricultural College,
Guelph, Ontario, Canada.

State Beekeepers' Organizations--A beekeepers' organization exists
in practically every State. Information about them can usually
be obtained through your State department of agriculture, agri-
cultural college or experiment station.



Growth Through Agricultural Progress